

Chemical Reactions Introduction

Reactants

Water H_2O
 Sodium bicarbonate $NaHCO_3$
 Calcium chloride $CaCl_2$
 Bromothymol blue

ask a question
 (use your imagination)
 hypothesis
 record a procedure
 do the experiment
 record careful observations
 (use measurements)

Coefficient - How many molecules there are.
 Subscript - How many atoms there are.

$2 NaHCO_3$ sodium bicarbonate
 Sodium - 2 atoms
 Hydrogen - 2
 Carbons - 2
 Oxygen - 6

$Ca(OH)_2$ hydroxyl group
 Calcium - 1
 Oxygen - 2
 Hydrogen - 2

$3 Ca(OH)_2$

Calcium - 3

Oxygen - 6

Hydrogen - 6

Reactants	Observation
$CaCl_2 + H_2O$	
$CaCl_2 + B.B.$	
$NaHCO_3 + H_2O$	
$NaHCO_3 + B.B.$	

Reactants	Observations
$CaCl_2 + NaHCO_3 +$ ② H_2O	
$CaCl_2 + NaHCO_3 +$ ③ B.B.	
$NaHCO_3 + CaCl_2$ ①	dust, no change

CaCl_2 - Use a film canister
 (pellets roll)
 1-5 pellets
 Mass of ^{empty} canister _____ g
 Add pellets _____ g
 Subtract the _____ g
 canister _____ g

NaHCO_3 -
 Mass a Blue Paper _____ g
 Add tip of a scoop _____ g
 Subtract mass of _____ g
 paper _____ g

1. CaCl_2
2. NaHCO_3
3. 10 mL H_2O -
Grad. Cyl.
4. Data Studio

Reactants →
Chemical Reaction
 Letters -
 atoms
 Products →

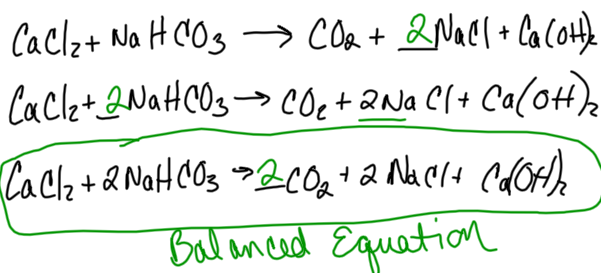
React	a	lace	name
cat	an	lame	trance
act	ace	alarm	
action	art	nail	trim
race	trance	ion	rat
rice	rain	time	camera
crime	train	he	ten
I	local	him	

Chemical Reaction -
 a process where atoms
 of the reactant molecules
 are mixed and rearranged
 to form new molecules
 (product)

Reactants
 Bromothymol Blue H_2O
 CaCl_2 NaHCO_3
Possible Products
 Cl_2 NaCl CO_2
 HCl Ca(OH)_2

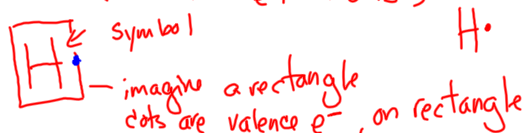
Signs of a Chemical Reaction Taking Place

- ① Bubbles / Foam — A gas is formed.
- ② Temperature Change $\left\{ \begin{array}{l} \uparrow \text{Exothermic} \\ \text{(Energy Released)} \end{array} \right.$
- ③ Color Change — $\left\{ \begin{array}{l} \downarrow \text{Endothermic} \\ \text{(Energy Absorbed)} \end{array} \right.$



Lewis Dot Structures

In a chemical reaction, only the outermost electrons participate.
(valence electrons)



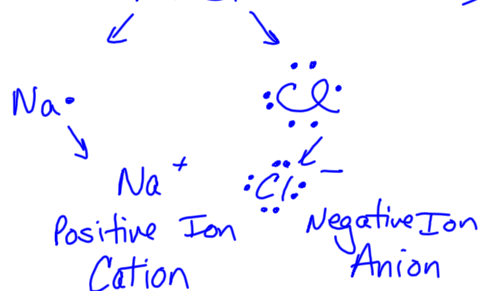
He^\bullet Complete outer shell
 $2e^-$

$\cdot\text{B}\cdot$ Boron - Group 13
valence e^- - 3
Shows us that Boron can lose $3e^-$ or share $3e^-$

$:\text{N}^\bullet$ Nitrogen - Group 15
valence e^- - 5
Shows that N will gain $3e^-$ or share $3e^-$

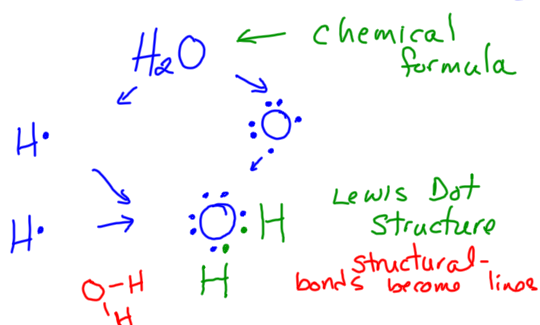
Ionic Bonds

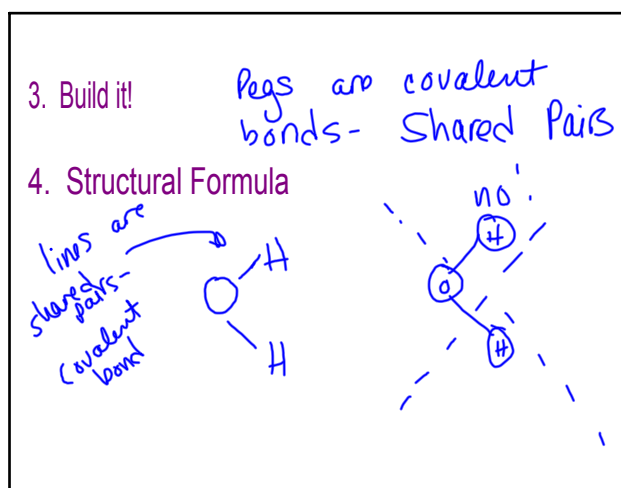
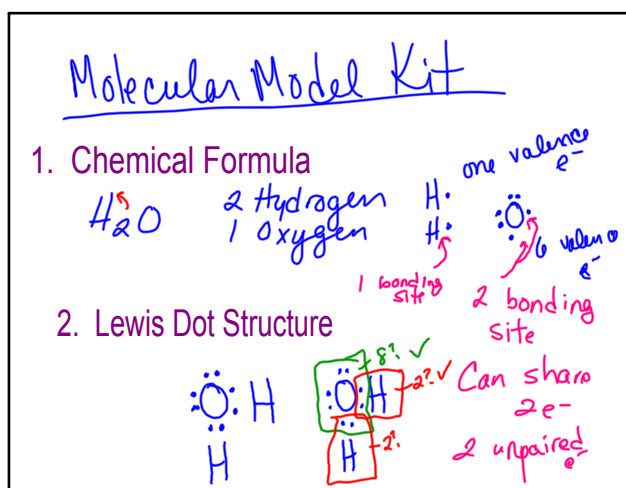
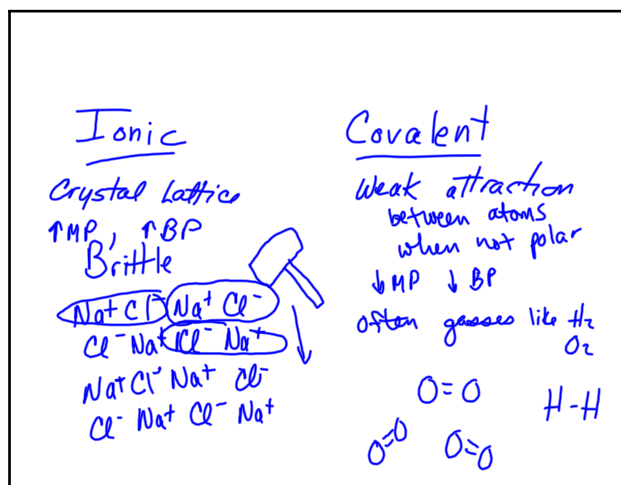
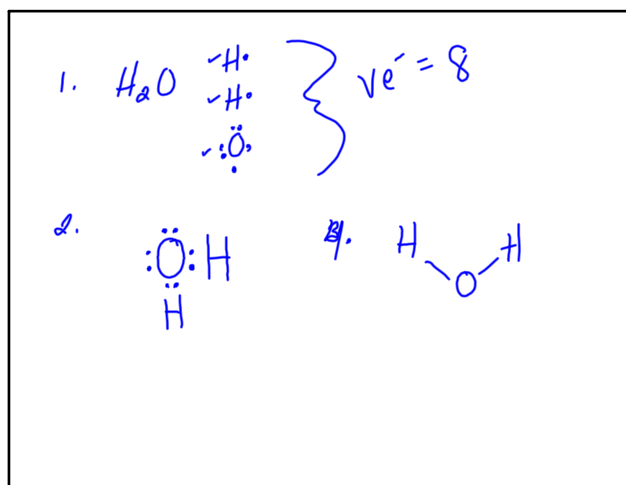
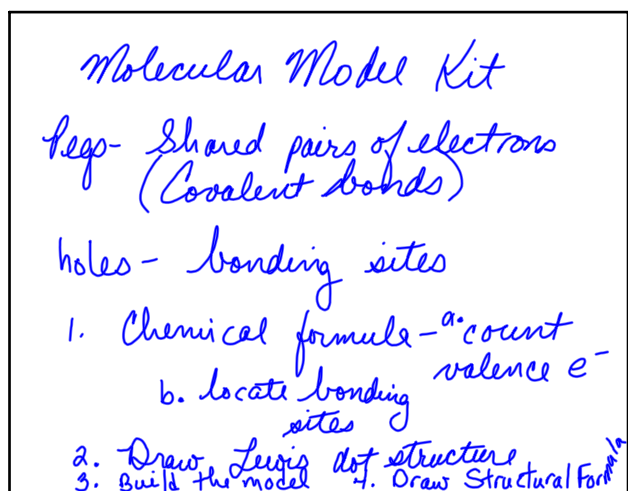
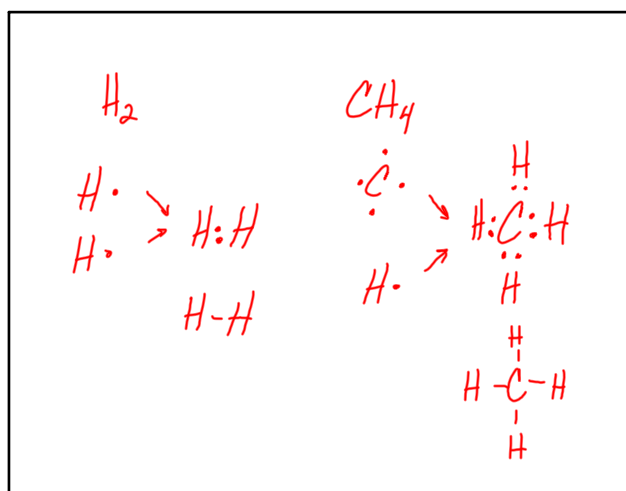
Sodium chloride (Salt)

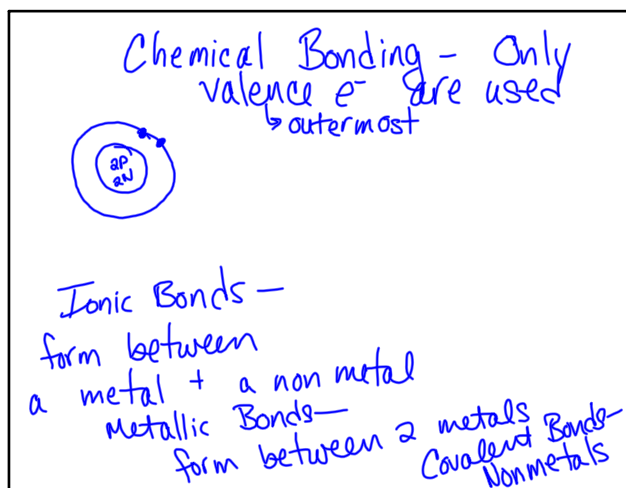
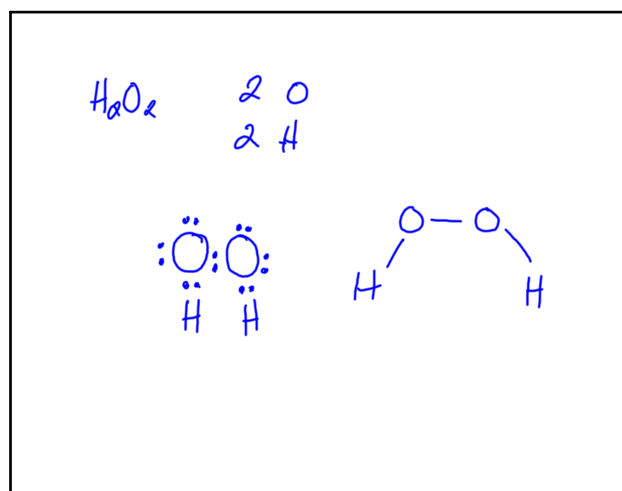
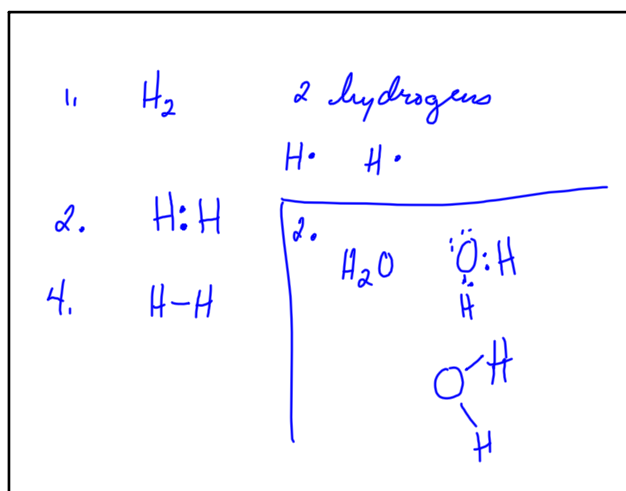


Covalent Bond

electrons are shared



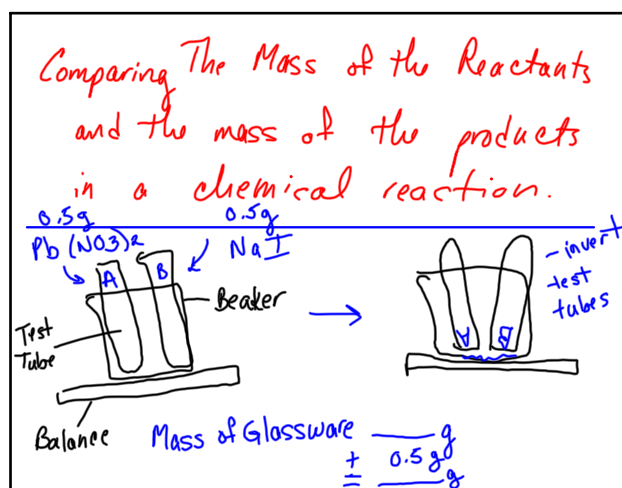
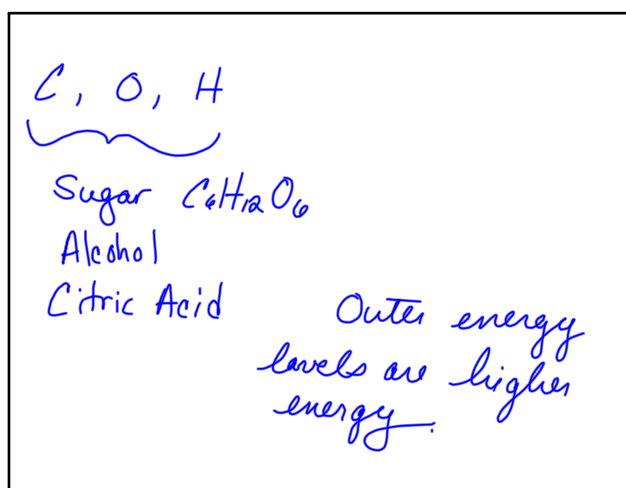




Group Numbers on Periodic Table

Group	1	2	3-12	13	14	15	16	17	18
Valence e^-	1	2	?	3	4	5	6	7	8

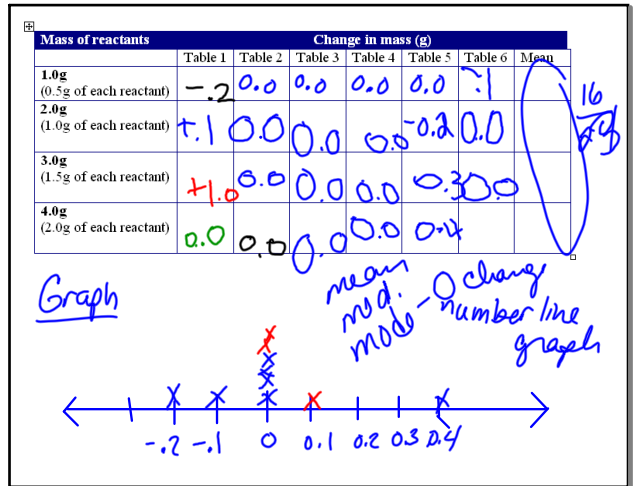
He 2



→ Balanced

→ more

→ less



① Strong Statement

Evidence —

Relation

Variation —

Central Tendency

② Hypotheses

③ Explanation

Concepts — Application

mass is form
chemical atoms
reaction
signs a reaction

Lead Nitrate Post Lab

1. $Pb(NO_3)_2$ - Lead nitrate
 NaI - Sodium iodide
Ionic Compounds

2. ions $Na^+ Cl^-$

3. color change
a solid formed

4. Double Replacement Reaction
ions switch places

5. Lead nitrate and sodium iodide

6. Lead iodide, sodium nitrate

7. * mass of the products was equal to the mass of the reactants *

The Law of Conservation of Mass ! -

* mass is neither created nor destroyed in ordinary physical & chemical changes.

8. Balancing an Equation

Reactants → Products

$Pb(NO_3)_2 + NaI \rightarrow PbI_2 + NaNO_3$

$Pb(NO_3)_2 + NaI \rightarrow PbI_2 + 2 NaNO_3$

$Pb(NO_3)_2 + 2 NaI \rightarrow PbI_2 + 2 NaNO_3$

Balanced !

9. soluble

10. insoluble, precipitate

yellow
precipitate